

## **THE IMPACTS OF CAPITAL GOOD IMPORT AND HUMAN CAPITAL ON ECONOMIC GROWTHS OF NIGERIA AND SOUTH AFRICA: AN AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL APPROACH.**

<sup>1</sup>Festus Olumide, FAWEHINMI; <sup>2</sup>Victoria. Monisola, OSHO; <sup>3</sup>Sunday, A. KEJI

<sup>1</sup>PhD Student, Department of Economics, Ekiti State University, Nigeria,

<sup>2</sup>Department of Marketing, School of Business Studies, Federal Polytechnic Ado Ekiti, Nigeria

<sup>3</sup>Department of Economics and Development Studies, Federal University, Oye Ekiti, Nigeria

### **ABSTRACT**

The impacts of capital good import and human capital on economic growth of Nigeria and South Africa are being examined through cointegration and Autoregressive Distributed Lag (ARDL). Our findings were better revealed on comparative terms, the relationships between capital goods import, human capital and economic growth. The results reveal that capital good import and human capital indicators determine economic growth of South Africa both in the short run and long run, while Nigeria's economic growth rate only responds to capital goods import indicators in the long run. The estimated results further reveals that labour pattern in terms of work rate e.g. labour force and education e.g. secondary school enrolment are differ between the two economies. The glaring fact is that huge population of Nigeria's labour force has not been contributing significantly to her economic growth due to large number of unskilled labour compared to South Africa with high level of skilled labour despite having relatively few labour force.

**Keywords:** good import, human capital, economic growth, nigeria, south Africa

### **1.0 INTRODUCTION**

A major pre-occupation of economists is to account for the vast differences in both human capital and income per capita across time and space. This is because for high income countries of today, per capita income has not always been this high and for poor countries, the difference in the per capita income compared to the rich countries is enormous (Romer, 1988). A succinct examination of the trend of global economic growth over the last six decades reveals how the rich nations have moved from their initial relatively poor economies to their present day state.

Various studies also show how the gap between the poor and rich economies has been widening. (OECD, 2012, World Bank Report 2013, UNDP HD Report 2015).

The entire GDP of the world stood at US\$13,054.6 billion in 1980 with the richest country, USA accounting for US\$ 2,862.5 billion which constitutes 21.9 percent while countries like Nigeria and South Africa from Sub-Saharan African region claimed to have less than 2.3 percent component of the total world GDP. However, by 2000, the share of the richest country in global GDP has increased to US\$ 10,284.8 billion, while the absolute value of the global GDP has increased to US\$49,541.5 billion. This indicates that as the world output of goods and services increases (e.g. in terms of both human and capital goods), the share of the richest countries has been on the increase. . It is interesting to note that in 2000, the entire South Africa and Nigeria share of global GDP was not up to a tenth of that of the United States of America at US\$1,187.9 billion and US\$ 10,284.8 billion respectively. (IMF, World Economic Outlook, 2016).

Human capital theory views schooling and training as investment in skills and competences (Schultz, 1960 and 1961). Nelson and Phelps (1966) in their contribution to the human capital theory opine that a more educated/skilled workforce makes it easier for a firm to adopt and implement new technologies, thus reinforcing returns on education and training. This view buttresses the Schultz's position that expectation of return on investment is the driving force propelling individuals to make decisions on education and training they receive as a way of augmenting their productivity. The early proponents of the endogenous growth theory, Lucas (1988) and Romer (1990) take into account human capital through education stock. Lucas harps on technology while Romer concentrated more on research and development (R&D) as means of enhancing human capital development. Contemporary researchers have on the basis of the postulations by Lucas (1988) and Romer (1990) been able to consider human capital as a positive externality on capital productivity and that its accumulation favourably influences economic growth.

This assertion has been supported by numerous studies. Young (1998) documented how the four Asian tigers of Hong-Kong, South Korea, Taiwan and Singapore had grown at an average rate of 7-8 percent per annum between the 25 years of 1966-1991. The study showed that during this period, the size of the GDP of each of these countries was 8 times its original size at the beginning of the period. However, for typical Sub-Saharan Africa countries like Nigeria and South Africa, this has not been so, while the growth rate of global economy averages 3-5 percent between 1980 2015 that of two countries was far less than 2.8 percent on the average.

Technological progress has been identified as the main driver of sustained growth in output per capita. This fact has been established both theoretically (Solow, 1956), and empirically (Mankiw, Romer and Weil 1992). Developed countries have been shown to have very high capital labour

ratio and labour augmenting technological progress. Interestingly, to be able to use this technology efficiently these economies also invested massively in human capital development with the fastest growth rate of investment in human capital in the world in the last five decades (Raveh and Rashef, 2013). The reason for this massive investment is simple; it is only a well-educated labour force that can respond to the disequilibrium caused by the adoption of technology from abroad.

However, this has not happened in Nigeria and South Africa. The poorest region in the world is still characterized by both poor human capital development strategy and poor linkage to foreign technology, which is none except of Africa. Low level of human capital development in turn hinders technological transfer as the workforces of these countries are not capable of tapping and improving upon the latent and embodied technology in even the afforded capital imports. Indeed, it appears that it is the twin problems of low human capital development and low level of capital imports which manifests in poor performance of the manufacturing sectors and by extension results in infrastructural deficits while also manifesting as shortage of highly skilled labour force especially in Nigeria, tend to slow down the economic growth rate of these economies.

Given the above-highlighted statement of problem, the imperative questions to ask are: What is the general pattern of volume of trade in respect of human capital and capital goods imports by Nigeria and South Africa? How does the pattern of investment in human capital and capital goods import impact on economic growth and vice versa in Nigeria and South Africa? How regional differences among various economic entity in the selected countries affect the impacts of human capital and capital goods import on economic growth? Meanwhile, the broad objective of this study is to investigate how both capital goods import and human capital accumulation affect economic growth in Nigeria and South Africa. The specific objectives are: to determine the trend of the capital goods imports in relation to the total imports of Nigeria and South Africa. To examine the impacts of capital goods import and human capital on economic growth of Nigeria and South Africa. It is worthy to note that the findings of this study will assist stakeholders, policy makers in conjecturing the quantum of resource that the region should commit to the two variables in order to boost economic growth. This study provides quantitative evidence of the impact of both human capital goods and capital import goods structure on economic growth.

The period covered by this study which spans 1980-2014 is contingent upon availability of data from reliable sources. Thus this study ensures that the two major players from economic blocs of the sub-Sahara Africa are recognized.

## **2.0 LITERATURE REVIEW**

Nigeria and South Africa. In this study, proves to be a blend of the oil producing and non-oil producing countries is captured by the spectrum of countries to actualize the real picture of growth path in relationship with human capital and capital goods imports among different scholars.

Samer Abdul Mahid Al Rajoub (1999) analytically examined the role played by capital goods on the growth of the Jordanian economy (1970-1995), found that imported capital goods impacted positively and significantly on the growth of the Jordanian economy. In a related study, Mazumdar (2001), establishes the evidence that supports the position that imported machinery leads to higher growth in developing economies. By employing panel data, this researcher finds that when an economy invests in domestic production of equipment, growth rate tends to slow down, whereas investment in imported equipment galvanizes the growth rate.

Agiomirgianakis *et al* (2002) examined the role of human capital on economic growth by making use of a large panel data. In the empirical analysis, panel data was employed using dynamic panel data techniques for a set of 93 countries over a period of 27 years. The findings not only suggested the existence of a robust positive long-run relationship between education and economic growth, it also deduced that higher levels of education had strong effect on economic growth. Whereas, Haouas, Heshmati and Yagoubi (2005), investigate the impact of trade openness and high level of human capital on the economies of some MENA (Middle East and North Africa) countries like Pakistan, Egypt etc, using Fixed effects with endogeneity in the model reveal that trade openness significantly impact on production growth while human capital significantly impact the level of income but fails to impact on the underlying productivity growth.

Using vector autoregressive error correction *mechanism*, Bakare (2006) investigated the growth implication of human capital investment in Nigeria. He established a significant functional and institutional relationship between the investment in human capital and economic growth. Sankay, Ismail and Shaari (2010) used both the Johansen co-integration technique and vector error correction analysis to investigate the impact of human capital development on economic growth in Nigeria spanning 1970-2008. The trio was able to ascertain that development of human capital engenders economic growth.

Osei (2012), in his study titled “Import Demand and Economic Growth Analysis in Ghana” employed the Johansen Co-integration methodology and established a long-run relationship between import trade, income, foreign reserves, exchange rate and domestic price. He opined that more imports must be encouraged as there exists great potential of capital imports impacting economic growth. Nonetheless, Habiyaremye (2013), using a panel of 340 manufacturing firms

in Botswana, 1985-2008 finds a positive correlation between firms' imports of machinery and equipment and productivity growth and the effect on productivity is not concurrent but appears with a lag of up to two years.

**3.0 MODEL SPECIFICATION**

In this study single equation is used to achieve the objectives of the study. The model researches the impact of higher imported capital goods in domestic investment on the growth rate while also including a variable for human capital development which is measured by secondary school enrolment and labour force participation. This model takes its foundation from Lee (1995).

$$GY_i = \text{Constant} + aZ = b_iI_i + e_i$$

In reference to the theoretical framework, which calls for specifying panel co integration and error correction model; and following the work of Oseigbe (2015) which is in tandem with the Lee's position, and with slightest modification, the below model is being specified to examine the relationship among capital goods import, human capital and economic growth in Nigeria and South Africa.

$$\text{GDP} = f(\text{ICG/GDP, INV/GDP, TOP/GDP, LBF, PER, FDI/GDP, SSE, EXR}) \dots 3.15$$

$$\ln\text{GDPgr} = \ln\text{ICG/GDP} + \ln\text{INV/GDP} + \ln\text{TOP/GDP} + \ln\text{LBF} + \ln\text{PER} + \ln\text{FDI/GDP} + \ln\text{SSE} + \ln\text{EXR} \dots 3.16$$

$$\ln\text{GDPgr} = a_0 + a_1\ln\text{ICG/GDP} + a_2\ln\text{INV/GDP} + a_3\ln\text{TOP/GDP} + a_4\ln\text{LBF} + a_5\ln\text{PER} + a_6\ln\text{FDI/GDP} + a_7\ln\text{SSE} + a_8\ln\text{EXR} + U_{it} \dots 3.17$$

where

- GDPgr = growth rate of GDP
- ICG/GDP = ratio of imported capital goods to GDP
- INV/GDP = ratio of investment to GDP
- TOP/GDP = ratio of trade openness to GDP
- LBF = Labour Force Participation
- PER = Primary goods export
- FDI/GDP = ratio of foreign direct investment to GDP
- SSE = Secondary School enrolment
- EXR = Exchange rate

The expected signs of the coefficients are to be either positive or negative  $a_1, a_2, a_3, a_4, a_5, a_6, a_7$  and  $a_8$

The conventional unit root tests no longer hold sway in the face of the advantages inherent in the panel unit root test. Levin, Lin and Chu (2002) show that there is a considerable improvement in the power of unit root tests when using panel data other than the univariate testing procedures. The panel unit root test explores the data characteristics of the panel before proceeding to the panel co integration test. The idea is to test for stationarity of each variable used in the study. According to Engel and Granger (1997), a variable may not be stationary but a linear combination of the non-stationary variables may be stationary hence the need for co integration. The method of panel unit test adopted for this study includes Im, Pesaran and Shin (IPS) test, Livin-Lin Chu and Augumented Dickey Fuller (ADF) tests. The IPS test has been proven to be suitable in verifying stationarity of variables in panel data (Im, Pesaran and Shin, 2003), (Maddala and Wu, 1999). The basic IPS specification is given by:

$$\Delta Y_{i,t} = \alpha Y_{i,t-1} + \sum_{j=1}^{Pi} \gamma_{ij} \Delta Y_{i,t-j} + \beta_0 + \beta_{1t} + \beta_1 x_{i,t} + \epsilon_{i,t} \dots \dots \dots 3.18$$

Where  $\beta_0$  is the constant,  $X_{i,t}$  represents the explanatory variables,  $\Delta Y_{i,t}$  is the explained variable,  $\beta_{1t}$  is a time trend and  $P$  is the required lag length. The null hypothesis to be tested for the IPS is  $H_0 : \alpha_i = 0$  for all “i”s while the alternative hypothesis is  $H_1 : \alpha_i < 0$ , for at least one i. The lag lengths are selected using the Akaike Information Criterion. According to Westerlund (2007), all series must largely be non-stationary series i.e I (1) before a panel co integration test can be carried out.

Meanwhile, **ARDL panel approach to co integration** had suggested that the long-run relationships exist only in the context of co-integration among integrated variables (Johansen 1988; Philips and Hansen 1990). However, Pesaran and Smith (1995), who introduced the mean group, and Pesaran, Shin and Smith (1999), who introduced the pooled mean group, provided a new technique that has made it possible to derive consistent and efficient estimates of the parameters in a long-run relationship between both integrated and stationary variables in a panel data structure. These two concepts are discussed in turn as follows:

**The Pooled Mean Group (PMG)** allows the short-run coefficients, including the intercepts, the speed of adjustment to the long-run equilibrium values and error variances to be heterogeneous country by country, while the long-run slope coefficients are homogeneous across countries. While, **Mean Group (MG)** introduced by Pesaran and Smith (1995) calls for estimating separate regressions for each country and calculating the coefficients as unweighted means of the estimated coefficients. This does not impose any restrictions. It allows for all coefficients to vary and be heterogeneous in the long run and short run.

#### 4.0 ARDL MODEL ANALYSIS

The analysis starts with the investigation of order of integration of the variables and this is done through the unit root test.

It is worthy to note that the unit root test shows that the variables in both countries are either integration of order one that is I(1) or integration of order zero I(0). The implication is that the common Johansen Technique cannot be used to examine the long run impacts of capital goods import and human capital on the growth of both countries but rather we go for the time series version of the Auto Regressive Distributed Lag (ARDL).

To achieve our research objectives in a revealing manner, we begin with the lag length selection criteria of gross domestic product at growth rate thus:

**Table 4.1 Lag length selection for GDPGR (Nigeria)**

Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	-90.2821				21.1431	5.88917	5.90425	5.93543*
1	-88.9349	.06325	1	0.801	22.0656	5.93129	5.97652	6.07006
2	-88.9666	2.6311	1	0.105	20.7203*	5.86881*	5.89897*	5.96133
3	-88.9084	.05308	1	0.818	23.5155	5.99409	6.05441	6.17912
4	-88.7807	.25547	1	0.613	24.9115	6.05037	6.12576	6.28165

**Table 4.2 Lag Length Selection for GDPGR (South Africa)**

Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	-66.6631				4.60667	4.36536	4.38044	4.41162*
1	-65.0875	.062	1	0.803	4.73733	4.3927	4.43798	4.5315
2	-65.1185	3.0891	1	0.079	4.44833*	4.33023*	4.36038*	4.42274
3	-64.8301	.51492	1	0.473	4.97397	4.44065	4.50096	4.62568
4	-64.8209	.01822	1	0.893	5.30974	4.50458	4.57997	4.73587

While, lag length selection criteria of the specified regressors across individual countries are carried out before proceeding to conduct **ARDL** short run and long run **estimation for both**

**Nigeria and South Africa.** The ARDL approach is used due to the result obtained from the unit root test.

Firstly, capital goods import maintains a significant positive relationship with the economic growth of South Africa. The implication of this on our result is the affirmation of the importance of capital goods import to the South African economy. Whereas, Nigeria’s capital goods import show less sign being significant both in the long run and short run on estimated ARDL models. The implication of this on our result is the affirmation of the importance of capital goods import to the South African economic growth than that of Nigeria. Effect of FDI on both economies is also different. The coefficient of FDI in South Africa is positive and significant but the reverse is the case for Nigeria where the coefficient failed to pass the test of statistical significance. The implication is that FDI is contributing more to the growth of South Africa economy than Nigeria.

From human capital perspective, the coefficient is positive and significant in both the long and short run equations for South Africa but the reverse is the case for Nigeria. Meanwhile, Primary export and investment maintain their positive significant impact on economic growth of the selected countries. Thus, underscoring the importance of primary export and investment expansion to the growth of the Nigeria and South Africa. Interestingly, it is worthy to note that investment and primary export both have significant long and short run impacts on economic growth at country levels.

**Table 4.3: ARDL model for Nigeria and South Africa**

Variables	Nigeria		South Africa	
	Coeffeicient	Standard error	Coeffeicient	Standard error
LR ICG_INV	0.056683**	0.060408	0.170132**	0.083659
EXR	0.034493**	0.017400	-1.842783**	1.297899
INV	0.215024**	0.092632	2.507133**	1.660542
LBF	0.000270	0.000647	0.005367**	0.005371
TOP	-19.558789**	8.658030	-18.933149**	9.707539
PER	1.027787**	0.125576	1.136756**	1.115222
SSE	0.066788	0.057638	0.534352**	0.555483
FDI	0.000000	0.000000	0.023459**	0.189560



SR	Nigeria		SR	South Africa	
D(GDPGR(-	0.346133***	0.124278	D(GDPGR(-	0.642110**	0.072777
D(ICG_INV)	0.051110	0.075886	D(ICG_INV)	0.847876**	0.194032
D(EXR)	0.066422**	0.030673	D(EXR)	-1.132284***	0.231316
D(INV)	0.763072***	0.178435	D(EXR(-1))	0.773326*	0.219136
D(INV(-1))	0.228699	0.133639	D(INV)	0.056037**	0.076331
D(LBF)	0.000384	0.001356	D(INV(-1))	1.004144	0.112806
D(TOP)	-12.972428**	4.727253	D(LBF)	0.000368**	0.000892
D(TOP(-1))	35.633247**	6.919893	D(LBF(-1))	0.003870	0.001092
D(PER)	0.882788**	0.169902	D(TOP)	-17.216911**	1.671499
D(PER(-1))	0.871826***	0.247628	D(PER)	0.485408***	0.167905
D(SSE)	0.182729	0.117652	D(PER(-1))	0.507969**	0.121272
D(FDI)	-0.000000	0.000000	D(FDI)	0.054674**	0.098762
CointEq(-	-2.271136***	0.218255	D(SSE)	0.345029**	0.055627
			D(SSE(-1))	0.103502***	0.056811
			CointEq(-1)	-0.462899***	-11.118732

Trade openness shows a negative and significant relationship with the economic growth of the selected countries both in the short run and long run. Although, the level significant across the two countries has more of negative effects on the Nigerian economy compared to South Africa with -19.558789 and -18.933149 respectively in the long run. Whereas, from the labour force perspective, it remains significant in South Africa both in the long run and short run model but it is not in Nigeria. The active population in South Africa appears to be contributing much more to the growth of the county than it does in Nigeria. This underscores the quicker impacts of policies on country levels. However, exchange rate, the situation appears to be quite significantly different in both countries. While it shows a positive and significant relationship with economic growth in Nigeria, it shows a negative and significant relationship with economic growth of South Africa. This findings support the evidence of Dutch Disease in Nigeria.

**Table 4.4: Heteroskedasticity tests for Nigeria and South Africa ARDL Models**

Heteroskedasticity Test: Breuch-Pagan-Godfrey for Nigeria		
F-statistic	1.328688	Prob. F(16,16) 0.2882
Obs*R-squared	18.82893	Prob. Chi-Square(16) 0.2776
Scaled explained SS	3.718051	Prob. Chi-Square(16) 0.9993
Heteroskedasticity Test: Breuch-Pagan-Godfrey for South Africa		
F-statistic	1.025483	Prob. F(21,11) 0.5033
Obs*R-squared	21.84283	Prob. Chi-Square(21) 0.4086
Scaled explained SS	3.209076	Prob. Chi-Square(21) 1.0000

The last diagnostic test explored is the test for heteroskedasticity. The Breuch Pagan test is applied and the result shows that the probabilities of the F statistics, and the chi squares are greater than 5% in the two models. Therefore we also accept the hypothesis that there is heteroskedasticity problem in the two models

**5.0 CONCLUSION**

In so far, our findings were better revealed on comparative terms, the relationships between capital goods import, human capital and economic growth due to the results obtained from the above analysis.

It is a glaring fact that human capital and capital good import have both positive and significant impact on the economic growth of South Africa, compare to that of Nigeria where the positive coefficient does not impact on the growth. From Human capital angle, it reveals that labour pattern in terms of work rate e.g. labour force and education e.g. secondary school enrolment are differ between the two economies. This is in line with the conclusion of Fedderke (2005) that human capital in South Africa has been contributing positively to the growth of the country since the country got independence. In this regard, Fedderke further submitted that what makes human capital to be effective in growth process is its quality. Our results also confirm the conclusion by Kanayo (2013) and Omotayo (2014) that human capital has not been contributing positively and significantly to the growth of Nigeria despite her volume of population.

Exchange rate has been shown to be playing significant role in economic growth process and it is pivotal to the relationship between capital goods import and growth of Nigeria and South Africa. The important deduction from the study is that capital good import and exchange rate are inversely related in the countries under review that is currency appreciation improves capital goods import and the result from the study also shows that exchange rate and economic growth are inversely related. This is an indication that capital goods import will further enhanced growth when exchange rate is significantly inversely related to economic growth. This confirm Garlic (2013) conclusion that the importation of important capital goods that can aid domestic production cheaper for the domestic economy.

The negative effect of trade openness on the economic growth in the long run across the two countries should be given more attentions. The source of this ugly trend could be traced to policy that encourages porosity in border which is anti-growth in nature, therefore the findings from the study is in support of strict trade protection across the selected countries particularly Nigeria whose experienced higher level negative effect.

Again, the Nigerian government should employ better measure in educating her huge work force. The level of education should raised with what is obtainable in other emerging economies through policies that would drastic reduce the present illiteracy rate.

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